The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte BRIAN R. BENNETT
AND STEPHEN S. CHANG

Appeal No. 2006-1315
Application No. 09/470,329

ON BRIEF

Before JERRY SMITH, RUGGIERO, and MACDONALD, Administrative Patent Judges.

JERRY SMITH, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on the appeal under 35 U.S.C. § 134 from the examiner's rejection of claims 1-21, which constitute all the claims pending in this application.

The disclosed invention pertains to a method and apparatus for preventing live-lock in a multiprocessor system.

Representative claim 1 is reproduced as follows:

1. A method of preventing live-lock in a multiprocessor system, the method comprising:

identifying a first bus transaction that attempts to modify a shared resource;

setting a status bit to indicate that a bus transaction attempting to modify the shared resource is pending; and

retrying each subsequent nonmodifying bus transaction for the shared resource until the status bit is cleared.

The examiner relies on the following references:

Donley et al. (Donley)	5,761,446	June 02, 1998
Vogt et al. (Vogt)	5,897,656	Apr. 27, 1999
Gilbert et al. (Gilbert)	6,041,376	Mar. 21, 2000 (filed Apr. 24, 1997)
Arimilli et al. (Arimilli)	6,138,218	Oct. 24, 2000 (filed Feb. 17, 1998)

The following rejections are on appeal before us:

1. Claims 1, 2, 4, 5, 7 and 8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the teachings of Gilbert in view of Arimilli.

2. Claims 3, 6 and 9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the teachings of Gilbert in view of Arimilli and further in view of Donley.

3. Claims 10-21 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the teachings of Vogt in view of Gilbert.

Rather than repeat the arguments of appellants or the examiner, we make reference to the briefs and the answer for the respective details thereof.

OPINION

We have carefully considered the subject matter on appeal, the rejections advanced by the examiner and the evidence of obviousness relied upon by the examiner as support for the rejections. We have, likewise, reviewed and taken into consideration, in reaching our decision, the appellants' arguments set forth in the briefs along with the examiner's rationale in support of the rejections and arguments in rebuttal set forth in the examiner's answer.

It is our view, after consideration of the record before us, that the evidence relied upon and the level of skill in the particular art would have suggested to one of ordinary skill in the art the obviousness of the invention as set forth in the claims on appeal. Accordingly, we affirm.

In rejecting claims under 35 U.S.C. § 103, it is incumbent upon the examiner to establish a factual basis to support the legal conclusion of obviousness. See In re Fine, 837 F.2d 1071, 1073, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). In so doing, the examiner is expected to make the factual determinations set forth in Graham v. John Deere Co., 383 U.S. 1, 17, 148 USPQ 459, 467 (1966). The examiner must articulate reasons for the examiner's

decision. In re Lee, 277 F.3d 1338, 1342, 61 USPQ2d 1430, 1434 (Fed. Cir. 2002). In particular, the examiner must show that there is a teaching, motivation, or suggestion of a motivation to combine references relied on as evidence of obviousness. Id. at 1343, 61 USPQ2d at 1433-34. The examiner cannot simply reach conclusions based on the examiner's own understanding or experience - or on his or her assessment of what would be basic knowledge or common sense. Rather, the examiner must point to some concrete evidence in the record in support of these findings. In re Zurko, 258 F.3d 1379, 1386, 59 USPQ2d 1693, 1697 (Fed. Cir. 2001). Thus the examiner must not only assure that the requisite findings are made, based on evidence of record, but must also explain the reasoning by which the findings are deemed to support the examiner's conclusion. However, a suggestion, teaching, or motivation to combine the relevant prior art teachings does not have to be found explicitly in the prior art, as the teaching, motivation, or suggestion may be implicit from the prior art as a whole, rather than expressly stated in the references. The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would

have suggested to those of ordinary skill in the art. In re Kahn, 441 F.3d 977, 987, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006) (citing In re Kotzab, 217 F.3d 1365, 1370, 55 USPQ2d 1313 (Fed. Cir. 2000)). See also In re Thrift, 298 F. 3d 1357, 1363, 63 USPQ2d 2002, 2008 (Fed. Cir. 2002). These showings by the examiner are an essential part of complying with the burden of presenting a prima facie case of obviousness. Note In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). If that burden is met, the burden then shifts to the applicant to overcome the prima facie case with argument and/or evidence. Obviousness is then determined on the basis of the evidence as a whole and the relative persuasiveness of the arguments. See id.; In re Hedges, 783 F.2d 1038, 1039, 228 USPQ 685, 686 (Fed. Cir. 1986); In re Piasecki, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984); and In re Rinehart, 531 F.2d 1048, 1052, 189 USPQ 143, 147 (CCPA 1976). Only those arguments actually made by appellants have been considered in this decision. Arguments which appellants could have made but chose not to make in the brief have not been considered and are deemed to be waived [see 37 CFR § 41.37(c)(1)(vii)(2004)].

We consider first the rejection of claims 1, 2, 4, 5, 7 and 8 based on Gilbert and Arimilli. Since appellants have only argued this rejection with respect to independent claims 1 and 7, we will limit our consideration to these independent claims, and the dependent claims will stand or fall with their respective parent claim. With respect to claims 1 and 7, the examiner essentially finds that Gilbert teaches the claimed invention except that Gilbert does not show that the status flag is made up of a single bit and that live-lock is prevented. The examiner cites Arimilli as teaching these features. The examiner finds that it would have been obvious to the artisan to apply the teachings of Arimilli to the system of Gilbert [answer, pages 3-5].

Appellants argue that the cited portions of Gilbert fail to teach the step of setting a status bit to indicate that a bus transaction attempting to modify the shared resource is pending as recited in claim 1 or the step of setting a status bit to indicate that a bus transaction attempting to modify the cache line is pending as recited in claim 7. Appellants assert that the setting of the hold flag in Gilbert is based on receiving data which is a completely different reason than the basis used to determine if the status bit of claims 1 and 7 will be set.

Appellants argue that Arimilli also fails to teach the setting of the status bit as recited in claims 1 and 7. Finally, appellants argue that the examiner has not pointed to anything of record in either Gilbert or Arimilli in support of the combination of their teachings [brief, pages 9-13].

The examiner responds that Gilbert teaches that the status flag is set in response to a write request which meets the claimed attempt to modify a shared resource as recited in claims 1 and 7. The examiner also notes that Arimilli was cited for nothing more than its teaching that a status flag could be comprised of a single bit. Finally, the examiner responds that the motivation to combine the teachings of Gilbert and Arimilli comes from the knowledge of one skilled in the art as well as specifically from Arimilli [answer, pages 13-19].

Appellants respond that the examiner has relied on two different fields in Gilbert to meet the single status flag of the claimed invention. Specifically, appellants argue that the examiner has relied on field 76 to supply the element of setting a status bit, but that this field is not used to retry subsequent non-modifying bus transactions for the shared resource until the status of this field is cleared because field 82 performs this

function. Appellants also reiterate that the examiner has still failed to show how the references provide a teaching or suggestion to form the proposed combination [reply brief, pages 1-6].

We will sustain the examiner's rejection of independent claims 1 and 7, and consequently, of dependent claims 2, 4, 5 and 8 as well. With respect to the combinability of the teachings of Gilbert and Arimilli, Arimilli is used only to teach that a status flag can be made up of a single bit. We agree with the examiner that the person of ordinary skill in the art would have found it obvious to use a single bit for the "hold for forward progress" field 82 in Gilbert. Although Gilbert may set the hold status field 82 for situations in addition to write requests, claims 1 and 7 only require that the status bit be set when a bus transaction is attempting to modify (write to) the shared resource. We agree with the examiner that the field 82 in Gilbert is set for such write requests. Gilbert also teaches that once the hold flag is set, other nodes are required to retry their requests until the hold status is cleared [see Figure 8C]. We do not agree with appellants' argument that the examiner is relying on two different fields to meet the claimed invention.

Specifically, the field in Gilbert which is set and cleared is the "hold for forward progress" field 82. Field 76 only retains an indication of the type of request that triggered the status of field 82. The examiner has never indicated that field 76 was being relied on as the claimed status bit.

We now consider the rejection of claims 3, 6 and 9 based on Gilbert, Arimilli and Donley. In addition to the teachings discussed above, the examiner acknowledges that Gilbert and Arimilli fail to teach clearing the status bit randomly or pseudo-randomly. The examiner cites Donley as teaching this feature. The examiner finds that it would have been obvious to the artisan to add the teachings of Donley to the combined system of Gilbert and Arimilli [answer, pages 7-8].

Appellants argue that Donley fails to teach or suggest clearing of a status bit randomly or pseudo-randomly as recited in claims 3, 6 or 9. Appellants also argue that the examiner fails to explain how providing a random delay time would optimize the systems of Gilbert and Arimilli [brief, pages 13-15]. The examiner responds that Gilbert teaches that the status flag can be cleared by a counter of any value and Donley teaches random and pseudo-random values. The examiner also responds that the

use of random or pseudo-random values as taught by Donley would optimize live-lock avoidance as taught by Donley [answer, pages 19-21].

We will sustain the examiner's rejection of claims 3, 6 and 9 for essentially the reasons argued by the examiner. Gilbert and Arimilli collectively teach the invention as recited in claims 1 and 7 for reasons discussed above. Donley teaches the advantages of using randomness in dealing with live-lock situations. Therefore, we agree with the examiner that the artisan would have found it obvious to broadly clear the status bit in Gilbert randomly so as to further prevent live-lock as taught by Donley.

We now consider the rejection of claims 10-21 based on Vogt and Gilbert. Since appellants have only argued this rejection with respect to independent claims 10, 15 and 17, we will limit our consideration to these independent claims, and the dependent claims will stand or fall with their respective parent claim. With respect to claims 10, 15 and 17, the examiner essentially finds that Vogt teaches the claimed invention except that Vogt does not show the status indicator to indicate when a first one of the processors initiates a bus transaction attempting to

modify the shared resource as recited in claims 10 and 15 or the status indicator indicating that one of the bus transactions attempting to modify one of the cache lines is retried as recited in claim 17. The examiner cites Gilbert as teaching these status indicators. The examiner finds that it would have been obvious to the artisan to apply the teachings of Gilbert to the system of Vogt [answer, pages 8-13].

Appellants argue that Vogt is concerned with status indicators that indicate address conflicts and not with status indicators of the type recited in claims 10, 15 and 17. Appellants also argue that Gilbert fails to teach these missing elements. Appellants also argue that the motivation for the combination proposed by the examiner is merely a conclusory statement and is not supported by the record. Appellants assert that combining Gilbert with Vogt does not guarantee forward progress of processor requests [brief, pages 15-18]. The examiner responds that Vogt teaches that the bus transaction is retried and Gilbert teaches the status indicator as claimed. The examiner also responds that Gilbert provides the motivation for combining its teachings with Vogt. Finally, the examiner asserts that the combination of Gilbert with Vogt does guarantee forward progress of the processor request [answer, pages 21-24].

We will sustain the examiner's rejection of independent claims 10, 15 and 17, and consequently, of dependent claims 11-14, 16 and 18-21 as well. As discussed above, Gilbert teaches a field 76 indicating when a processor has requested a bus transaction to modify (write to) a shared resource and Gilbert also teaches a field 78 indicating that a bus transaction is to be retried. Vogt is cited to teach that it was well known to use status indicators in a computer system. We agree with the examiner that it would have been obvious to the artisan to use status indicators to indicate the status of the various fields in Gilbert. Appellants' arguments are broad conclusory statements with no explanation or analysis in support of them. In our view, the examiner's rejection addressed the claim limitations in a manner sufficient to have at least established a prima facie case of obviousness. Appellants' arguments are too general and conclusory to persuade us that the rejection is improper.

In summary, we have sustained each of the examiner's rejections of the claims on appeal. Therefore, the decision of the examiner rejecting claims 1-21 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a)(1)(iv).

AFFIRMED

JERRY SMITH)
Administrative Patent Judge)
)
)
JOSEPH F. RUGGIERO) BOARD OF PATENT
Administrative Patent Judge) APPEALS
) AND INTERFERENCES
)
)
)
ALLEN R. MACDONALD)
Administrative Patent Judge)

JS/kis

Appeal No. 2006-1315
Application No. 09/470,329

SCHWEGMAN, LUNDBERG, WOESSENER & KLUTH, P.A.
P. O. BOX 2938
MINNEAPOLIS, MN 55402